



Diabetes management during travel



Adrienne A Nassar^{*1,2}, Curtiss B Cook³ & Steve Edelman¹

Practice Points

- Patients should visit their diabetes physician 4–6 weeks prior to travel.
- A physician letter describing diabetes diagnosis, medications, supplies, the need to carry sharps and physician contact information should accompany the diabetes traveler at all times.
- Diabetic travelers should pack medications (including rescue glucose medications), supplies, snacks and a first aid kit in their carry-on luggage.
- The traveler should pack twice as many needed medications and supplies should be packed in case they are needed abroad.
- Physicians should remind travelers with diabetes to pack needed protective clothing (hat and sunglasses), wear comfortable shoes and keep well hydrated.
- Diabetic travelers should be advised to research local cuisines, hospitals and clinics prior to departure.
- Physicians should encourage travelers with diabetes to investigate their medical insurance coverage and remind them to carry their insurance card and any needed medical identification with them at all times.

SUMMARY Travelers with diabetes can face challenges during their trips, particularly international travelers. Scheduling a meeting with their diabetes healthcare team is crucial to ensure their diabetes is appropriately controlled amidst pitfalls that may arise during the departure, travel and arrival phases of their trip. Patients should meet with their diabetes healthcare team at least 1 month prior to travel to allow ample time for the physician to generate a diabetes travel letter and for the traveler to obtain prescriptions for needed medications, equipment and supplies. Patients should research local medical treatment facilities, pharmacies and cuisines of their final destination before their departure. Diabetes medications and supplies should be packed in carry-on luggage for easy access whilst traveling. Wearing protective clothing, comfortable shoes and maintaining hydration are key measures in preventing health complications while abroad. Diabetes is a manageable disease and with safe travel planning, individuals can ultimately enjoy their travel destinations.

¹Division of Endocrinology, University of California San Diego, San Diego, CA, USA

²VA San Diego Healthcare System, 3350 La Jolla Village Dr., 111G, San Diego, CA 92161, USA

³Division of Endocrinology & Division of Preventive, Occupational & Aerospace Medicine, Mayo Clinic Arizona, Scottsdale, AZ, USA

*Author for correspondence: anassar@ucsd.edu

Background

Travel, whether for pleasure or business, involves scenarios in which individuals voluntarily place themselves in unfamiliar environments. Individuals with chronic illnesses, such as diabetes, may be particularly vulnerable to the emotional and physical stresses associated with traveling. Nearly 37 million US citizens traveled abroad in 2010 [101]. The national estimate of diabetes prevalence is approximately 8% [102], suggesting that almost 3 million US citizens traveling internationally in 2010 could have had diabetes. Diabetes is largely a self-managed disease, however, when unfamiliar foods, climate, time zone changes and living conditions are considered during times of travel, patients with diabetes may face unique challenges in caring for their diabetes. One study demonstrated that 15% of insulin-requiring travelers with diabetes stated their use of insulin affected their choice of travel destination, both in terms of health risk in developing countries and avoidance of long-haul travel [1]. However, patients with either Type 1 or 2 diabetes can travel safely if they employ appropriate self-management skills and adequate preparation. Several professional organizations have published guidelines regarding traveling with diabetes [103–108]. This paper presents a summary of recommendations (Box 1) and clinical insights that can be provided to patients with diabetes who are preparing to travel.

Pretravel recommendations

■ Patient visit with diabetes healthcare team

Patients with diabetes who are planning international travel or travel to developing areas of the world should schedule an appointment with their diabetes healthcare provider 4–6 weeks in advance of their trip to allow for patient–provider planning of diabetes care when traveling. If

such expertise is available, the visit may include a meeting with a diabetes educator and nutritionist if diabetes self-management skills need to be reinforced. This visit will allow an updated assessment of glycemic control, evaluation and review of the risks of travel and a discussion of the measures the patient can take to minimize these risks. Additionally, a review of key diabetes self-management competencies (e.g., recognition and treatment of hypoglycemia symptoms, sick day guidelines, self-monitoring of blood glucose requirements) can be accomplished. Important items to be discussed at this appointment include: the acquisition of a physician letter describing the patient's medical condition, current diabetes medication regimen and the patient's medical necessity to carry sharps (needles and lancets; Box 2) [2,3]. When possible, the content of the letter should be translated by someone who is knowledgeable on medical terms and who is familiar with the language, dialects and idioms of the destination country. Patients should be advised to plan for travel delays and lost luggage, so taking twice as many diabetes supplies and medications is recommended [4].

Travelers should be reminded that insulin concentration in the USA is U-100 but in other countries this may be U-40 or U-80 concentration. Furthermore, it is important to use the correct prelabeled syringes that are made to be used with specific insulin concentrations, since using the wrong syringes may deliver more or less insulin than desired. This may not be a concern for individuals who utilize insulin pen therapy rather than syringes. In addition, the unit of blood glucose measurement in the USA is mg/dl but in most other countries the unit is mmol/l, which is important to distinguish when communicating glucose levels to healthcare personnel in different countries. This proves important if an individual's glucose meter breaks while abroad and another one is purchased locally. Diabetes travelers should be aware that not all insulins or oral diabetes medications available in the USA will be available in every country throughout the world and that medications may be referred to by different names [5]. Therefore, it is important for travelers to have an on-hand list of their oral and injectable diabetes medications (with generic name) and their dosages.

Diabetes patients who utilize insulin pump therapy should be encouraged to call the manufacturing company to inquire about loaning a backup pump for international travel. Several

Box 1. Recommendations for what to pack.

- Physician letter
- Identification/medical alert bracelet
- Health insurance card
- Diabetes medications and prescriptions for them
- Rescue diabetes medications (glucose gel, tablets and glucagon pen)
- Supplies (syringes, lancets, test strips, sharps container and insulin carry case)
- Two glucose meters (in case one fails) with extra batteries
- If on insulin pump, twice as many pump supplies as may be needed
- Small first aid kit
- Comfortable shoes
- Protective clothing, depending on destination climate

insulin pump companies now have online forms that travelers with diabetes can fill out and submit electronically to request loaner devices. Patients should be reminded to call this number for possible troubleshooting of their pump whilst home or abroad. Most importantly, these travelers need to discuss an alternative basal-bolus insulin regimen in the form of long- and short-acting insulin in the event of pump failure with their physicians, and medications should be filled prior to departure.

Immunization against common and travel-related vaccine-preventable diseases is recommended prior to departure for all travelers but is especially important in people with diabetes and other chronic diseases who may be immune suppressed [6]. Up-to-date travel immunization recommendations can be found on the Centers for Disease Control website for countries across the world [109]. Patients can be referred to travel clinics prior to travel to receive their vaccinations and recommended antibiotic prophylaxis.

The amount of information to remember may be overwhelming and so bringing one's family member or significant other to the initial physician-patient appointment may be helpful since they may also have to help with the diabetes care of the patient during travel.

■ Know the destination

The traveler should research information regarding the climate and environmental conditions of the final destination. For instance, hot weather can adversely affect the health of the patient with either Type 1 or 2 diabetes and degrade medications, supplies and equipment, thus rendering them less effective [7–8]. Patients with diabetes are more susceptible to environmental stressors than those without diabetes [8]. Guidelines for managing diabetes in hot weather have recently been updated [9]. Patients taking insulin or other injectable diabetes medications that are heat sensitive should investigate the availability of refrigeration equipment (e.g., hotel room refrigerators, travel cold packs) at their final destination and plan accordingly if such amenities do not exist (i.e., travel cold packs can be packed prior to departure). In addition, colder environments can potentially damage diabetes medications and supplies. It is not recommended to use an insulin vial if ice crystals are present in the solution since this may alter the potency. Reading the package inserts for both oral and injectable diabetes medications and equipment

Box 2. Physician letter components for the diabetes traveler.

- Letter should be in English and in the native language of the country to be visited
- It should indicate whether the patient has Type 1 or 2 diabetes
- Medications and dosages (if insulin pump, include settings and also basal-bolus backup regimen should the pump malfunction)
- Emergency glucose supplies (glucose gel, tablets and a glucagon pen with a label on the box)
- Supplies (glucometer, testing strips, lancets, syringes and batteries)
- Need to carry sharps (needles and lancets)
- Physician name and contact phone number

is important, as they may include unique operating temperatures, humidity levels and other environmental condition recommendations for optimal usage and functioning. Packing suitable clothing and attire is recommended based on the destination climate. Protective gear, such as hats, sunglasses, sunscreen, gloves, boots and comfortable shoes will go a long way in allowing patients with diabetes to enjoy their trip without placing themselves at risk for heat exhaustion, cold exposure or foot ulcers [10].

■ Diet

Food options for diabetic travelers may be limited during travel so planning ahead is key. This is probably most relevant during air travel, as automobile and maritime travel typically offer greater flexibility in dietary choices [11]. For flights during which a meal will be served, diabetic patients can call and speak to an airline representative regarding special diabetic dietary requests. Furthermore, trip destination and flight duration are important with regards to food options available for consumption. Packing healthy snacks in carry-on luggage can mitigate disrupted dietary patterns that can occur during flight time. Access to such foods may be limited during travel and so should be carried at all times to help prevent or treat hypoglycemic events. Furthermore, when traveling to countries where English is not the primary language, food labels and restaurant menus may be difficult to interpret for individuals with diabetes who rely on carbohydrate counting. Investigating region-specific dietary options using the internet may be helpful before departure although many restaurants now note low-carbohydrate options on their menu. If unsure, travelers with diabetes can generally rely on known low-carbohydrate options (e.g., salads with chicken or fish, nuts, string cheese and eggs) [12]. However, not all patients with diabetes implement a low-carbohydrate cuisine in their daily lives, and so regular

blood glucose checks while traveling will prove most beneficial in providing some direction for the self-management of their disease. Should a traveler with diabetes request more formal education, meeting with a dietician prior to departure may be an option to discuss dietary choices and carbohydrate availability while abroad [13].

■ Medical identification

Medical alert necklaces and bracelets may be a functional way to alert medical personnel of one's diabetes condition, should the patient become unable to relay this information themselves. Patients with diabetes should be encouraged to obtain and wear this identification during travel. In addition, the American Diabetes Association has created a 'Diabetes Alert Card' for patients to carry at all times during travel.

■ Travel health insurance

Diabetic travelers need to call their medical insurance companies and review their medical coverage policies during travel should unforeseen emergencies arise [110]. Of note, Medicare does not cover medical care outside of the USA so Medicare-eligible patients with pre-existing medical conditions, particularly those with diabetes, should obtain adequate supplemental insurance, if they don't have it already. They should have easy access to their health insurance identification card and travel with this at all times. Diabetic travelers should also locate the nearest hospital and pharmacy in their intended destination before arrival in case medical assistance is required. Patients should inquire if English is spoken in these institutions so that the language barrier does not become a barrier to their potentially emergent need for diabetes care. Furthermore, they should ensure that their health insurance is accepted at these facilities beforehand to avoid expensive medical bills or unforeseen costs. A list of health facilities in destination countries can be obtained through the USA Department of State [101]. This information can also be obtained from local American embassies or foreign tour offices and from the International Association for Medical Assistance to Travelers [111].

Recommendations during travel

■ Airport security

International travel security has become stricter in recent years. If traveling by airplane, diabetic passengers should research the current

Transportation Security Agency (TSA) guidelines either online [107] or by calling +1 866 289 9673 for information regarding the handling of diabetes medications and supplies information. Diabetic travelers should tell their TSA officer that they have diabetes and are transporting diabetes medications and supplies. They should have their signed physician letter ready attesting to this, if requested. According to the Federal Aviation Administration guidelines, insulin vials and glucagon kits must show the pharmacy label [112]. When returning via air from outside of the USA, passengers should contact the airline to determine if the country of origin has any specific airport security restrictions or requirements regarding diabetes medications or equipment.

If a diabetes traveler is wearing an insulin pump, he or she should remind their TSA agent that the insulin pump should not be removed since it is attached via a catheter underneath the skin. However, travelers should remember that ultimately they need to abide by rules, regulations and requests by TSA officers while traveling. Diabetic travelers should check with their pump or continuous glucose monitoring equipment companies regarding recommendations for radiation exposure. Several pump and CGM manufacturing companies allow the passage of their equipment through metal detectors but strictly recommend that their products should not be run through the luggage x-ray machines or body scanners that implement x-ray technology due to the potential risk of radiation-induced malfunction [113]. This information and other pertinent material may be available online and can be printed and shown to security personnel.

■ Storing diabetes medications & supplies

Taking snacks that contain simple but also complex carbohydrates is a good idea in addition to glucose tabs, gels or glucagon kits in case blood sugars fall low during hectic travel. Carrying all diabetes supplies in carry-on luggage is also a good idea for several reasons: this allows for easier accessibility while traveling and also avoids medications and supplies getting lost in unrecoverable luggage. Furthermore, temperature extremes may more frequently occur in the luggage compartments rather than in the cabin areas on airplanes, which is an important consideration when storing insulin vials. Injectable diabetes medications typically have optimal storage temperatures between 2 and 8°C (36–46°F) while oral medications should generally be stored

between 20 and 30°C (60–86°F) [9]. Insulin pumps generally have temperature tolerances of 5–40°C (41–104°F) and glucose monitoring devices from 10 to 40°C (50–104°F) but specific temperature ranges vary by manufacturer. Blood glucose testing strips should be kept in their tightly sealed containers to avoid exposure to moisture. Patients should be encouraged to read the package inserts of their diabetes medications, devices and equipment to ensure optimal functioning whilst at home or abroad.

■ Insulin on-board airplanes

Depending on flight duration, insulin may need to be administered on board an airplane. Travelers with insulin-requiring diabetes should be aware that due to pressure differences in the cabin area, resistance may arise when utilizing syringe plungers to draw up insulin [14]. Insulin pen devices may be used aboard airplanes and, again, due to potential cabin pressure differences, insulin may leak when applying the pen tip needle for use.

For those travelers utilizing insulin pump therapy on board an airplane, recent preliminary data suggests the possibility of unintended insulin delivery during ascent from bubbles precipitating out of insulin solution in the microtubules according to pressure gradients and Boyle's Law [15]. In addition, researchers have reported significant unintended insulin administration due to plunger movements during rapid catastrophic cabin depressurization. Overall, more data is needed before recommendations regarding insulin pump management during flight can be made, and most people who use this therapy do not report significant in-flight blood glucose deviations or adverse events [16]. However, it is generally only recommended that insulin pumps be disconnected in-flight prophylactically during a catastrophic depressurization scenario. It remains important to advise diabetic travelers to check their blood sugars frequently due to the confounding effects that stress, altered eating habits and altered diabetes medication administration times may have on overall blood glucose control.

■ Traveling across time zones

Diabetes management is based on a 24-h cycle. When traveling from west to east individuals should remember that the day shortens compared with when traveling from east to west, when the days become longer [17]. Usually, if fewer than five time zones are crossed during their travel, adjustments to insulin dosing are generally not

necessary [18]. When insulin-requiring diabetes travelers cross more than five time zones, specific recommendations should be made by their physician during their initial physician–patient encounter to discuss how insulin dosing or timing of administration should change based on time zone differences. For travelers who are managed on oral diabetes medications, timing is somewhat less important. Patients should be educated to not take their sulfonylurea if they will be missing meals during travel to avoid potential hypoglycemic events. However, other oral agents (e.g., metformin, DPP4 inhibitors, thiazolidinediones) can be continued as they generally do not cause hypoglycemic events.

Generally, it is helpful if travelers keep their wrist watch set to their departure time zone at least for the first day of travel. For short trips of fewer than 3 days duration, the diabetes traveler can consider keeping their watch set to the departure time zone for the entirety of their trip and take their medications as previously scheduled. However, for trips longer than 3 days, it would be more convenient for the traveler with diabetes to change their wrist watch to the local time zone of their destination. This will allow easier timing of diabetes medications and meals. The following are several examples of how to adjust various insulin regimens during international travel. Travelers should be encouraged to check blood sugars frequently during travel.

Adjusting insulin therapy during travel

■ Example 1

East-bound flight from Los Angeles, CA, USA to London, UK. Flight departs at 7:55 pm Los Angeles, CA time (which is 2:55 am London time) and arrives at 1:25 pm London time (which is 6:25 am Los Angeles, CA time). Total flight time is 10 h and 30 min.

Basal-bolus insulin regimen

A diabetes traveler normally takes 18 units of neutral protamine Hagedorn (NPH) and six units aspart before breakfast and 12 units NPH and six units of aspart before dinner. Since the flight is an evening flight, the traveler can take 12 units of NPH and 6 units of aspart prior to their dinner that is served on the flight. Since this is an international flight, breakfast will be served several hours prior to landing, and the diabetes traveler can take half of their morning NPH (9 units) with the full dose of aspart insulin (6 units). After landing,

later that evening around dinner time (London time), the diabetes traveler can take the other half of his NPH (nine units) and the full dose of aspart insulin (six units). The following morning (London time), the patient can resume their normal insulin dosing according to local time.

Basal-only regimen

A diabetic traveler normally takes 20 units of lantus at bedtime, metformin 1000 mg twice daily and glipizide 5 mg BID. This means they would take their full lantus dose (20 units) on board the airplane shortly after departure (10 pm). After arriving the following day in London, they should then take half of their normal lantus dose (10 units) at bedtime local time. The following evening (the second night in London), they can then resume the full dose of 20 units of lantus at bed time local time and be advised that their blood sugar may run higher than normal during the daytime. Oral diabetes medications can be taken 12 h apart as normally dosed, but if the traveler will not be eating regularly throughout this time, then they could skip one dose of their sulfonylurea (to avoid hypoglycemia) but still take their metformin, as indicated. Doing so would likely only allow transient hyperglycemia while acclimating to the time zone change.

■ Example 2

West-bound return flight from London, UK to Los Angeles, CA, USA. Flight departs at 9:30 am London, UK time (2:30 am Los Angeles, CA time) and arrives at 1:45 pm Los Angeles, CA time (8:45 pm London, UK time). Total flight time 11 h and 15 min.

Basal-bolus insulin regimen

A diabetic traveler normally takes 18 units NPH and six units aspart before breakfast and 12 units NPH and 6 units of aspart before dinner. They should take 18 units of NPH and 6 units of aspart with breakfast (either on the plane if breakfast will be served or prior to departure). They will be served lunch prior to landing and should take half of their NPH (6 units) with this meal (since his last dose of NPH would have been about 10 h ago at departure and will likely be wearing off). Then, later that evening (Los Angeles time), the traveler should give the other 6 units of NPH again with 6 units of aspart when they eat dinner. The following morning (Los Angeles time), they can resume their normal insulin dosing according to local time.

Basal-only regimen

A diabetic traveler normally takes 20 units of lantus at bedtime, metformin 1000 mg twice daily and glipizide 5 mg twice daily. This means they would have already taken their full lantus dose the night prior to departure (9 pm London time would be 2 pm Los Angeles, CA time). They will arrive in California the following day and not need their lantus dose until 2 pm (Los Angeles time). It would be easiest to take their full lantus dose at dinner (meaning it will be 28 h since the last dose so the patient should be advised they may experience transient hyperglycemia). Then, the following day, they can take all 20 units at bedtime to get back on a night-time schedule. Oral diabetes medications can be taken 12 h apart as normally dosed, but if the traveler will not be eating regularly throughout this time, then they could skip one dose of their sulfonylurea (to avoid hypoglycemia) but still take their metformin as indicated. Doing so would likely only allow transient hyperglycemia while acclimating to the time zone change.

■ Prevention of venous thromboembolism in air travelers

Travelers with diabetes may be at an increased risk of developing deep venous thrombosis [19,20]. Therefore, these travelers are encouraged to stand and walk during long flights every 1–2 h while awake and perform seated dorsiflexion/plantarflexion exercises to avoid venous stasis that could potentiate clot formation. Staying well hydrated throughout the flight may also decrease the risk of deep vein thrombosis formation.

Recommendations after arriving at travel destination

■ Physical activity

Depending on travel itineraries, individuals may perform more walking than they are accustomed to (whether at their destinations or in airports between security and boarding gates) and the increase in physical exercise may increase glucose utilization and lower blood sugars in addition to more rapid insulin absorption. Travelers with diabetes may need to slightly decrease their insulin dosages or eat more carbohydrates and snack between meals to keep blood glucose levels appropriately controlled [21]. When taking into consideration exposure to a new cuisine, a new environment and a potentially different physical activity level, travelers with diabetes will need to become comfortable managing their disease on

their own and can do so safely by checking their blood sugar frequently to understand how these factors may be influencing their overall glycemic control [14].

With potentially increased walking comes the need for comfortable footwear since blisters and abrasions can develop from improperly fitted shoes and can serve as an access point for bacteria. Wearing sandals on sandy beaches to decrease the introduction of bacteria and other stray objects remains a good idea in travelers with diabetes [22].

■ Keeping hydrated

Patients should be reminded to remain hydrated, especially when traveling to hotter climates. It is also important to know the quality of the potable water available at one's destination to avoid traveler's diarrhea and the ensuing dehydration [23,24].

Conclusion & future perspective

Being prepared by planning ahead will go a long way to achieving management self-confidence in the diabetes traveler and appropriate patient glucose control amidst a changing diet, time zone difference and a new environment. Diabetes is a manageable disease when patients and their

providers work together to formulate a treatment plan for travel. No destinations should seem 'off-limits' to individuals with diabetes, given the available resources that can be utilized in preparation for travel.

While the above guidelines represent a review of published opinion, there remains no data on how many diabetes patients actually travel, their destinations or the outcomes in terms of diabetes control during their trips. Moreover, although the recommendations outlined here seem reasonable, there is no information on how many patients actually have knowledge of them, or seek pretravel counseling, and the area remains largely understudied. More data on the diabetic traveling population is needed so that better evidence-based guidelines can be developed.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

References

Papers of special note have been highlighted as:

- of interest
- ■ of considerable interest

- 1 Burnett JC. Long- and short-haul travel by air: issues for people with diabetes on insulin. *J. Travel. Med.* 13(5), 255–260 (2006).
- 2 Dewey CM, Riley WJ. Have diabetes, will travel. *Postgraduate Med.* 105(2), 111–113, 117–118, 124–126 (1999).
- ■ Provides contact information for different diabetes traveler resources and a detailed overview of recommendations for diabetes travelers.
- 3 Lumber T, Strainic PA. Have insulin, will travel. Planning ahead will make traveling with insulin smooth sailing. *Diabetes Forecast* 58(8), 50–54 (2005).
- 4 Bettles TN, McKenas DK. Medical advice for commercial air travelers. *Am. Fam. Physician* 60(3), 801–810 (1999).
- 5 Dunning D. Safe travel tips for the diabetic patient. *RN* 52(4), 51–55 (1989).
- 6 Virk A. Medical advice for international travelers. *Mayo Clin. Proc.* 76, 831–840 (2001).
- 7 Westphal SA, Childs RD, Seifert KM *et al.* Managing diabetes in the heat: potential issues and concerns. *Endocr. Pract.* 16, 506–511 (2010).
- 8 Cook CB, Wellik KE, Fowke M. Geoenvironmental diabetology. *J. Diabetes Sci. Technol.* 5, 834–842 (2011).
- Discusses how diabetes management can be affected by various environmental conditions.
- 9 Westphal SA, Nassar AA, Childs RD *et al.* Diabetes self-management in the heat. *Pract. Diabetol.* 21–25 (2011).
- Patient-centered recommendations regarding diabetes management in warm environments.
- 10 Garofano C. Travel tips for the peripatetic diabetic. *Nursing* 7(8), 44–46 (1977).
- 11 Hieronymus L, Hepner A. Eating well while traveling. *Diabetes Self Manag.* 28(3), 48–52 (2011).
- Offers practical dining advice for diabetes patients during different modes of travel.
- 12 Pape J. Lower-carb options. *Diabetes Health* 13(6), 34 (2004).
- 13 Kulkarni K. Traveling and the diabetic meal plan. *Diabetes Educ.* 10(3), 67 (1984).
- 14 Casey P. Preparing our patients for travel. *Pract. Diabetol.* 30(4), 26–28 (2011).
- Provides a sample physician letter for diabetes travelers and practical tips during travel.
- 15 King B, Goss P, Paterson M, Crock P, Anderson D. Changes in altitude cause unintended insulin delivery from insulin pumps. *Diabetes Care* 34(9), 1932–1933 (2011).
- 16 Hirsch I. Hitting the dartboard from 40,000 feet. *Diabetes Technol. Ther.* 13(10), 1–2 (2011).
- 17 Chelminska K, Jaremin B. Travelling diabetics. *Int. Marit. Health* 53(1–4), 67–76 (2002).
- 18 Chandran M, Edelman SV. Have insulin will fly: diabetes management during air travel and time zone adjustment strategies. *Clin. Diabetes* 21(2), 82–85 (2003).
- ■ Discusses how to adjust insulin dosing based on time zones traveled and provides practical advice for diabetes patients during travel.

- 19 Aerospace Medical Association Medical Guidelines Task Force. Medical guidelines for airline travel, 2nd edition. *Aviat. Space Environ. Med.* 74(5), A1–A19 (2002).
 - 20 Ageno W, Becattini C, Brighton T, Selby R, Kamphuisen PW. Cardiovascular risk factors and venous thromboembolism: a meta analysis. *Circulation* 117, 93–102 (2008).
 - 21 Gustaitis J. Taking to the air with diabetes. *Diabetes Self Manag.* 19(3), 36–37 (2002).
 - 22 Mirsky S. Vacationing with diabetes, not from diabetes. *IMS Ind. Med. Surg.* 41(2), 28–30 (1972).
 - 23 Cradock S. The traveller with diabetes: answers to common queries. *Community Nurse* 3(4), 28–30 (1997).
 - 24 Hernandez, C. Traveling with diabetes. *Diabetes Self Manag.* 20(6), 120–123 (2003).
- **Websites**
- 101 US Department of Commerce Office of Travel and Tourism Industries. US International Outbound Air Travel For 2010. <http://tinet.ita.doc.gov/tinews/archive/tinews2011/20110927.html> (Accessed 16 January 2012)
 - 102 Centers for Disease Control and Prevention. National diabetes fact sheet, 2011. www.cdc.gov/diabetes/pubs/pdf/ndfs_2011.pdf (Accessed 16 January 2012)
 - 103 American Diabetes Association. When you travel. www.diabetes.org/living-with-diabetes/treatment-and-care/medication/when-you-travel.html (Accessed 24 October 2011)
 - 104 American Diabetes Association. Air travel and diabetes. www.diabetes.org/living-with-diabetes/know-your-rights/discrimination/public-accommodations/air-travel-and-diabetes (Accessed 24 October 2011)
 - 105 American Diabetes Association. Fact Sheet – air travel and diabetes. www.diabetes.org/assets/pdfs/know-your-rights/public-accommodations/fact-sheet-tsa.pdf (Accessed 24 October 2011)
 - 106 Centers for Disease Control and Prevention. Managing summer heat, traveling with diabetes. www.cdc.gov/features/diabetesandtravel (Accessed 24 October 2011)
 - 107 Transportation Security Agency. Travelers with Disabilities and Medical Conditions: Hidden Conditions. www.tsa.gov/travelers/airtravel/specialneeds/editorial_1374.shtm#3 (Accessed 16 January 2012)
 - 108 National Diabetes Education Program. Have diabetes. Will travel. http://ndep.nih.gov/media/have_diabetes_will_travel_508.pdf?redirect=true (Accessed 24 October 2011)
 - 109 Centers for Disease Control and Prevention. Travelers' health. wwwnc.cdc.gov/travel/ (Accessed 16 January 2012)
 - 110 US Department of State. Health issues. http://travel.his.com/travel/tips/health/health_4971.html (Accessed 16 January 2012)
 - 111 International Association for Medical Assistance to Travelers. <http://iamat.org> (Accessed 16 January 2012)
 - 112 Juvenile Diabetes Research Foundation. Traveling with Diabetes. http://jdrfsw.org/outreach/jdrf_resources_travel.pdf (Accessed 16 January 2012)
 - 113 US FDA. Medical devices. www.fda.gov/medicaldevices/safety/alertsandnotices/publichealthnotifications/ucm061994.htm (Accessed 16 January 2012)